



# The Role of Suisun Marsh in Meeting the Needs of Pacific Flyway Waterfowl

# Road Map

- ❑ Place Suisun Marsh in the context of continental waterfowl populations
- ❑ Describe modeling efforts to link population objectives to habitat needs
- ❑ Describe modeling approaches to assess the effects of tidal restoration, including areas of uncertainty



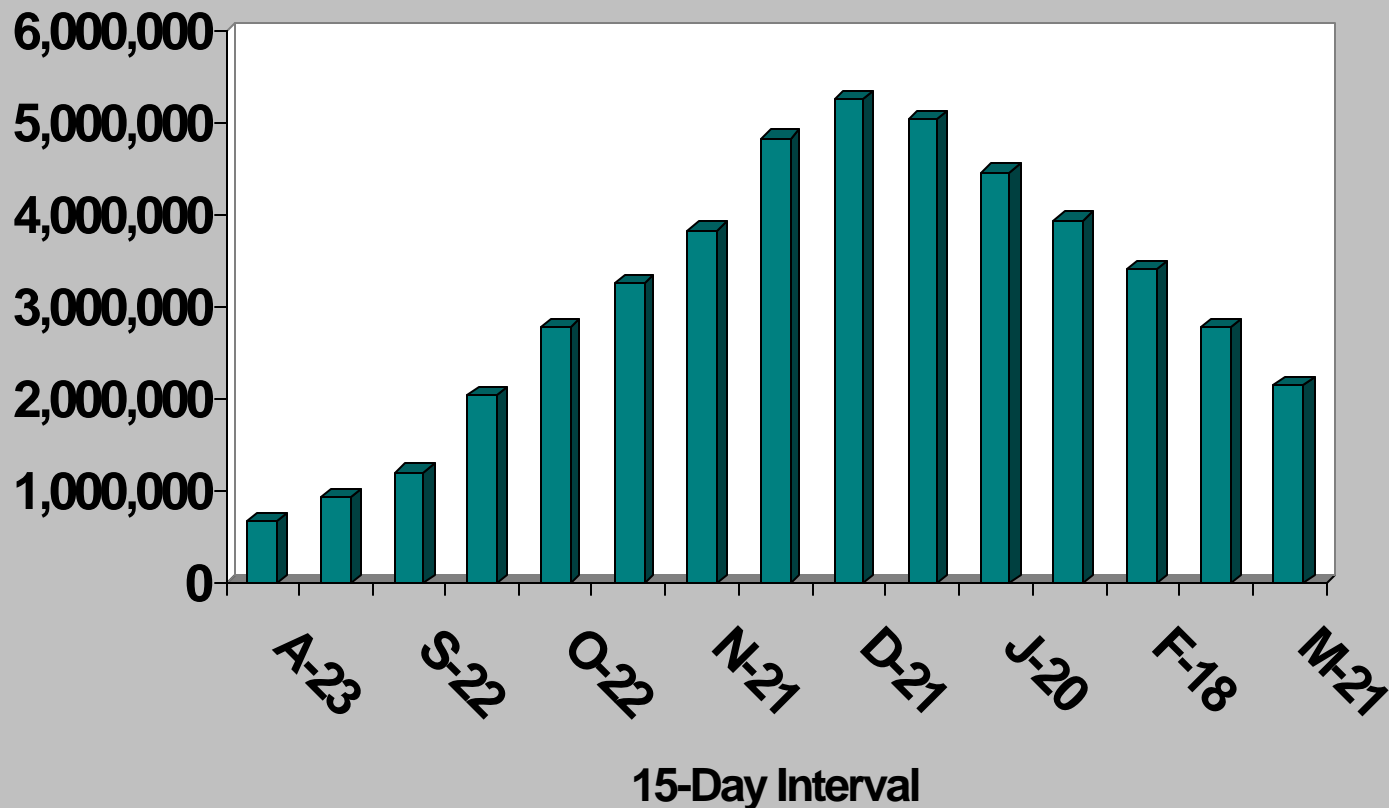




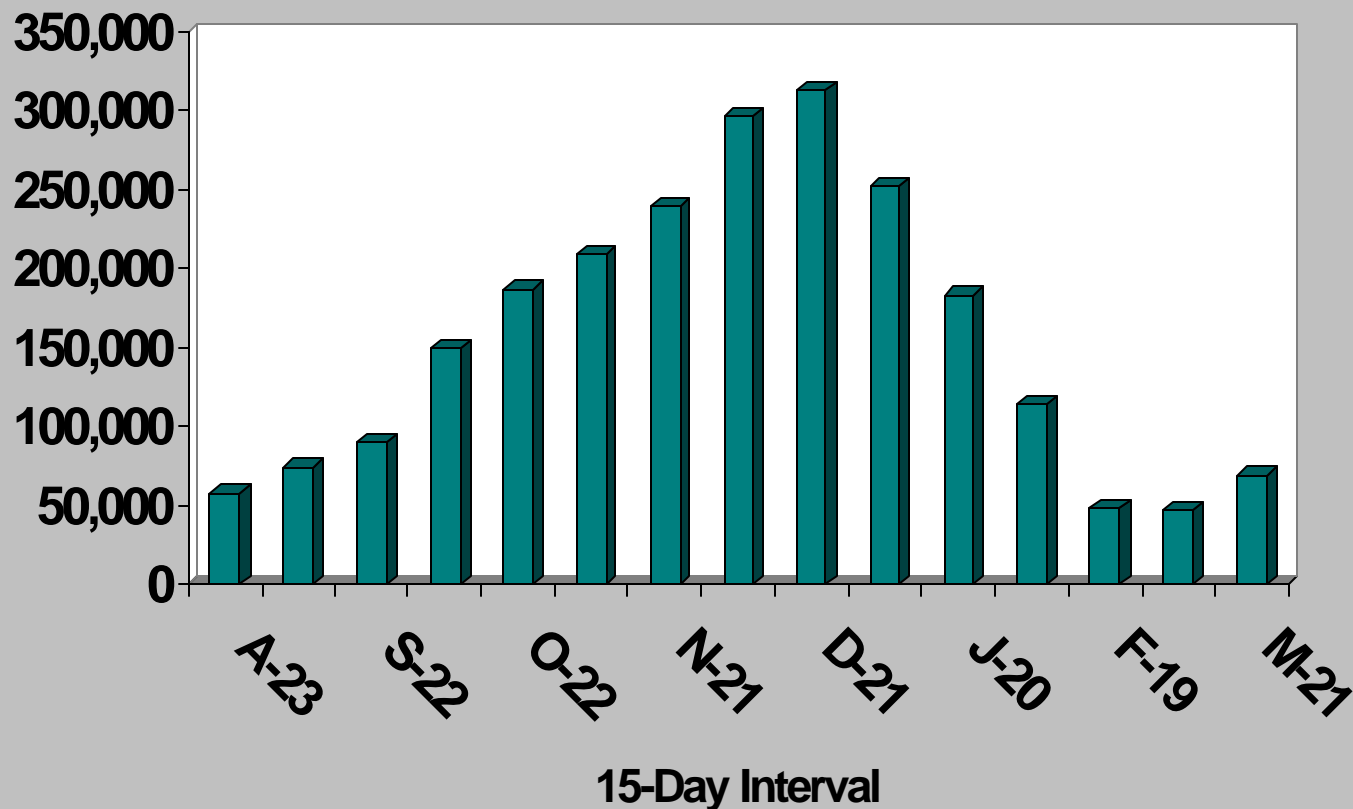
The image features two birds in flight against a clear blue sky. The bird in the upper left is a Goldeneye, shown in profile with its wings spread wide, revealing a mottled pattern on its back. The bird in the lower right is a Gadwall, also in profile with wings spread, showing a dark body and a prominent white patch on its neck. The text "100 Million Birds" is centered in the middle of the image.

100 Million Birds

# Central Valley Population Objectives



# Suisun Population Objectives



RED BLUFF

# CENTRAL VALLEY OF CALIFORNIA

Waterfowl Distribution

20%

CB

BB

SB

AB

YB

5%

SM

D

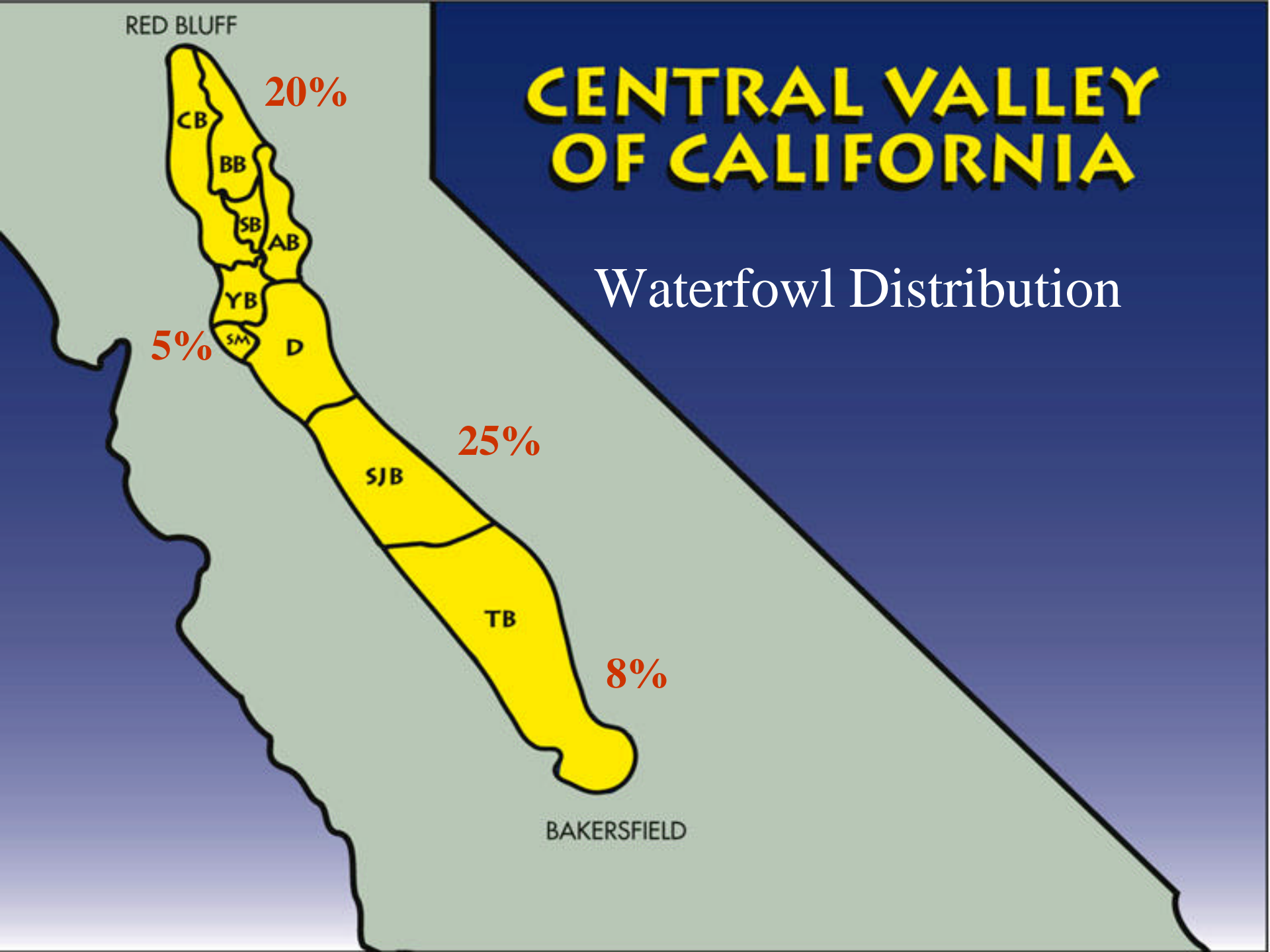
25%

SJB

TB

8%

BAKERSFIELD





# Converting Population Objectives Into Habitat Needs





# Key Biological Assumption



Food is the primary need of migrating and wintering waterfowl. Adequate foraging habitat will ensure that survival outside the breeding season does not limit population growth

## **Population Energy Demand**

**Population  
Objective**

**Bird Energy  
Needs**

## **Population Energy Supply**

**Habitat Acres**

**Foraging Acres**



**Deficit  
Enough  
Surplus**

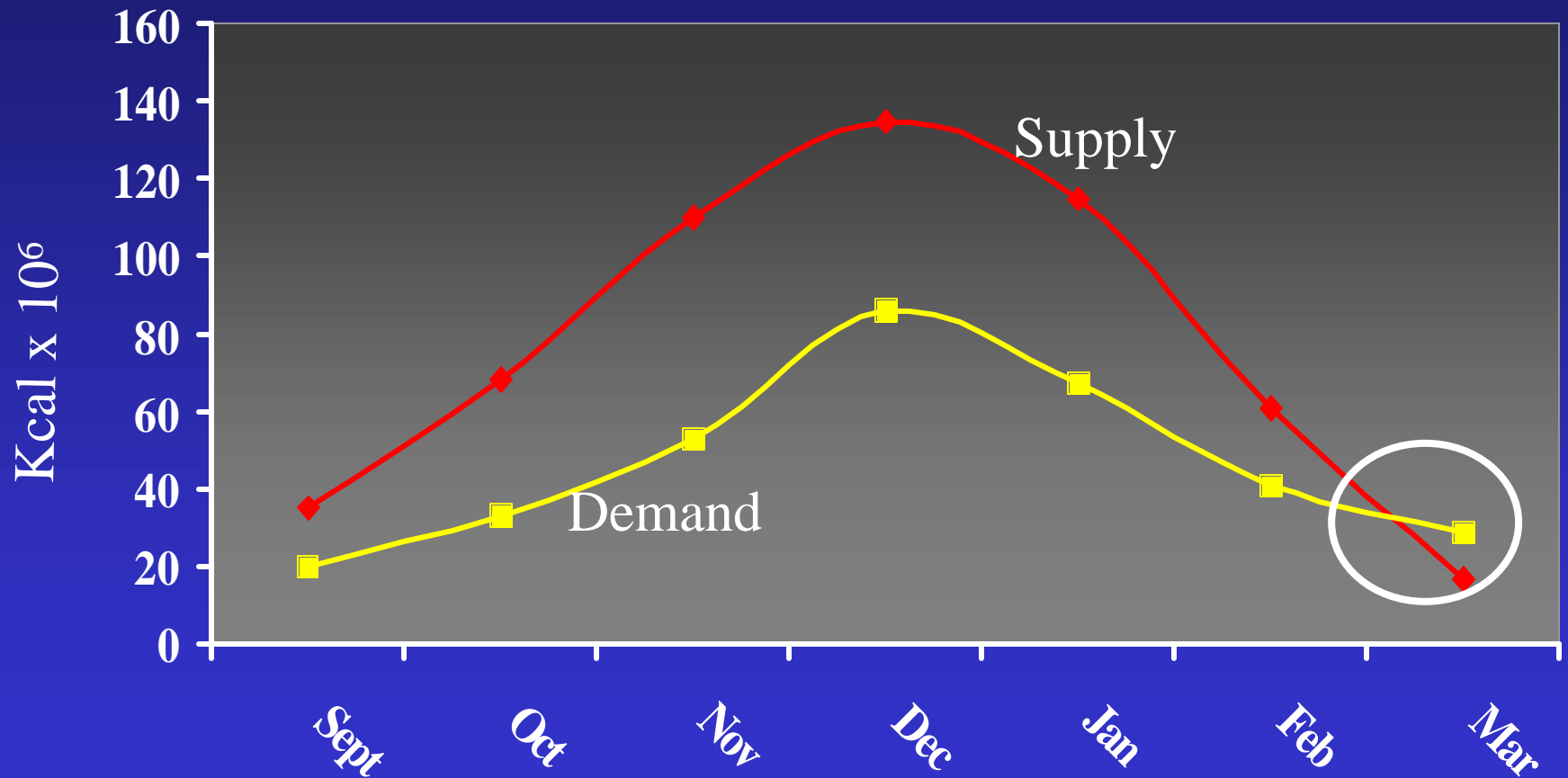
# Habitat Model for Wintering and Migratory Waterfowl



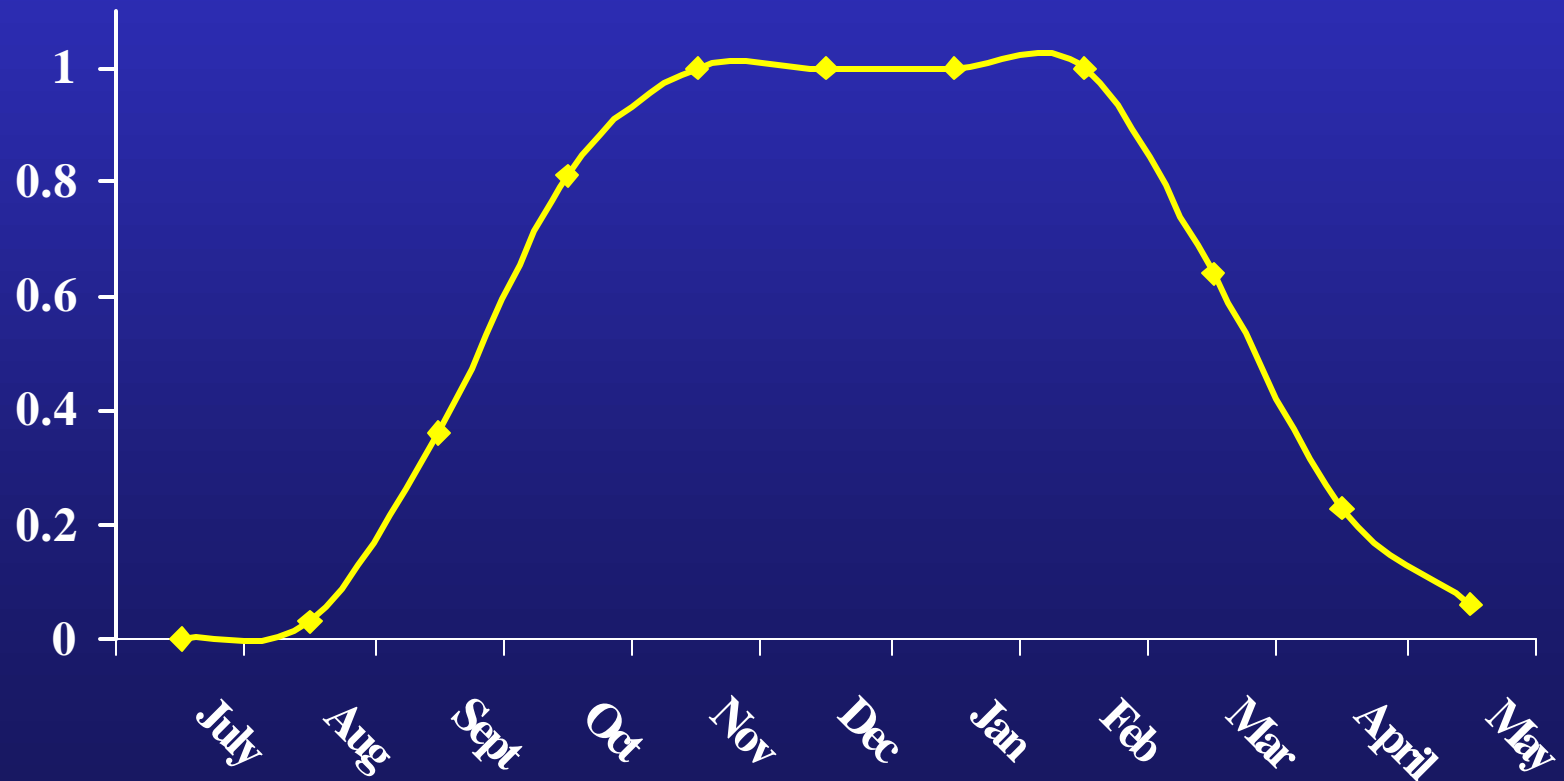
- How much is needed?
- Energetically based
- Stochastic
- Scale and region independent
- Estimate effects of changes in land use or management practises



# Energy Demand Vs. Energy Supply



# Flooding / Drawdown Schedules



# Non-Waterbird Effects



- Decomposition of foods
- Consumption of foods by non-waterbird species



## **Population Energy Demand**

**Population  
Objective**

**Bird Energy  
Needs**

## **Population Energy Supply**

**Habitat Acres**

**Foraging Acres**



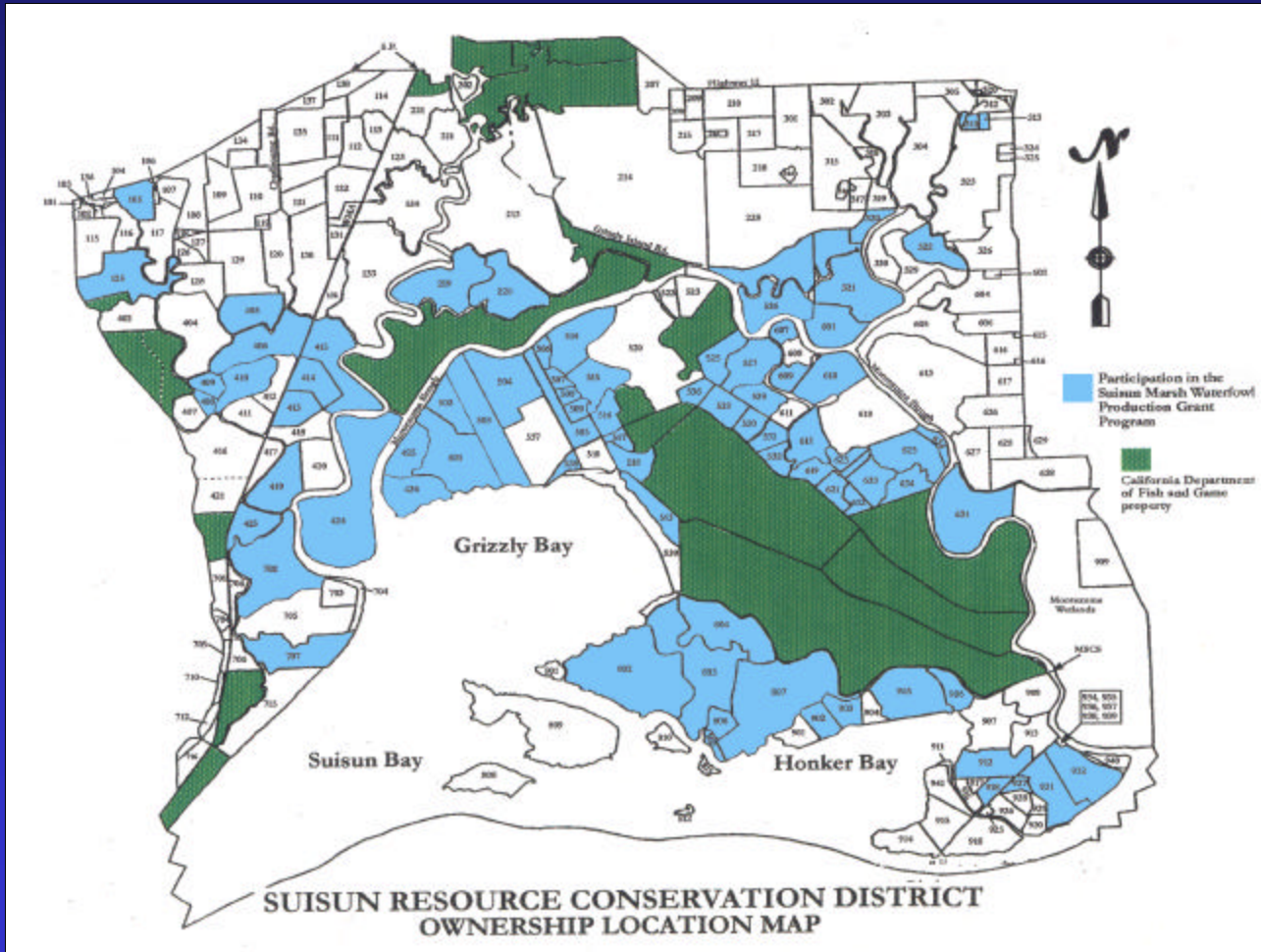
**Deficit  
Enough  
Surplus**

# Bird Energy Requirements



- Miller and Newton (1999)
- Endogenous contributions to DER
- Temporal Variation in DER

# Suisun Marsh: Habitat Types and Ownership









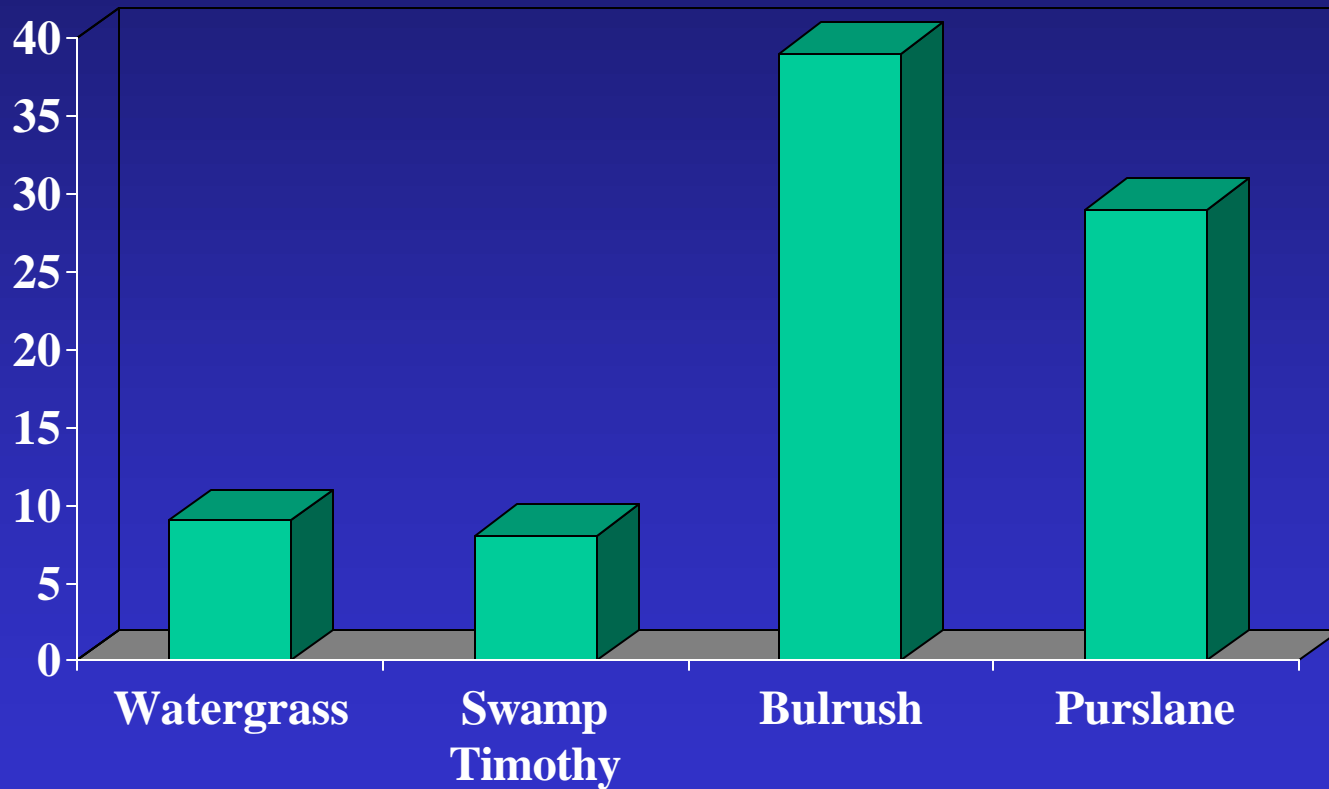
A close-up photograph of a grass field, likely a sorghum or similar grain, with green stalks and brown, seed-filled panicles. The background is a blurred landscape under a clear blue sky. The text "240 KG / Acre" is overlaid in the upper center.

240 KG / Acre





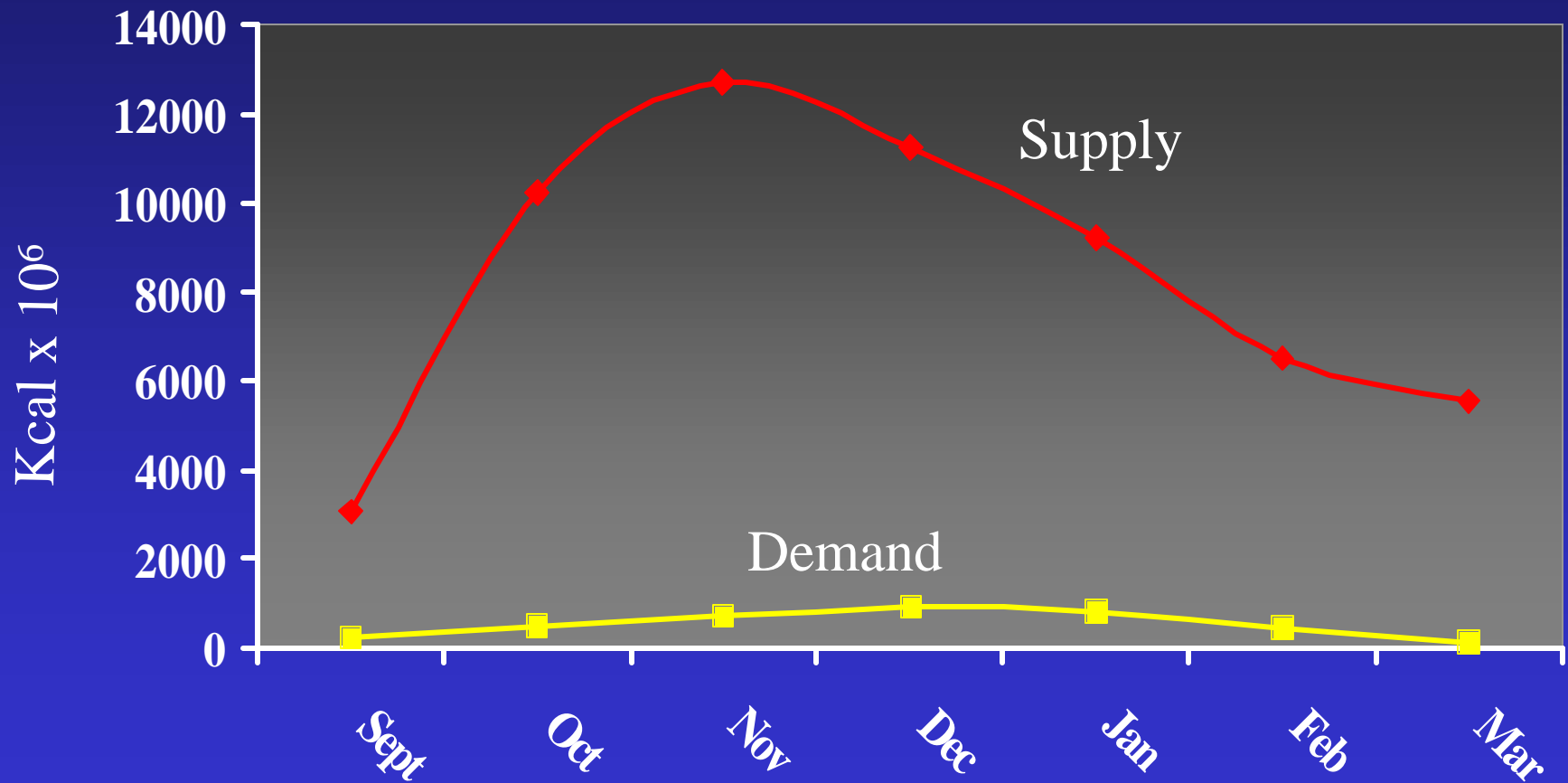
# Pintail Diets in Suisun



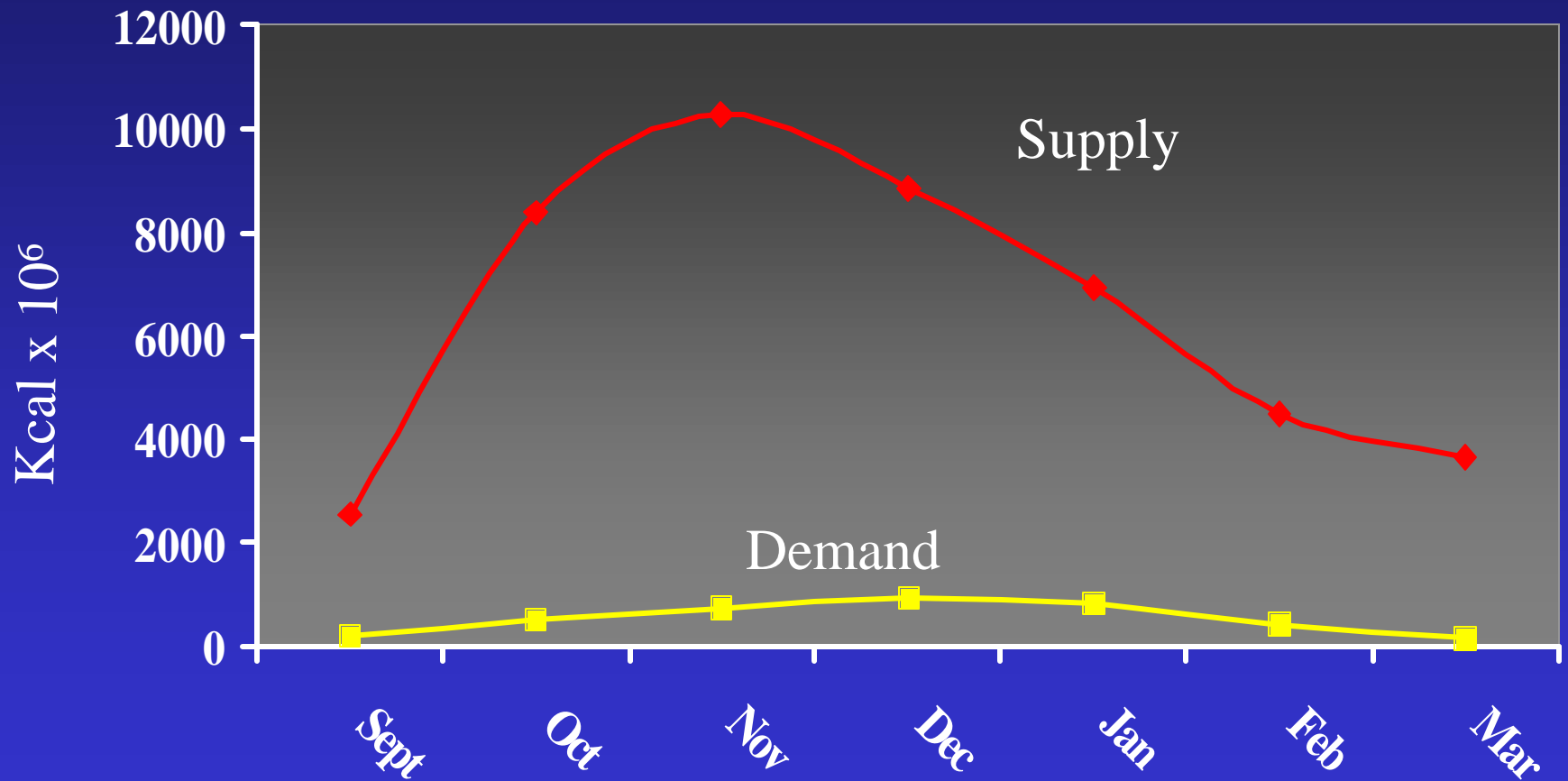
Burns et al. 2003



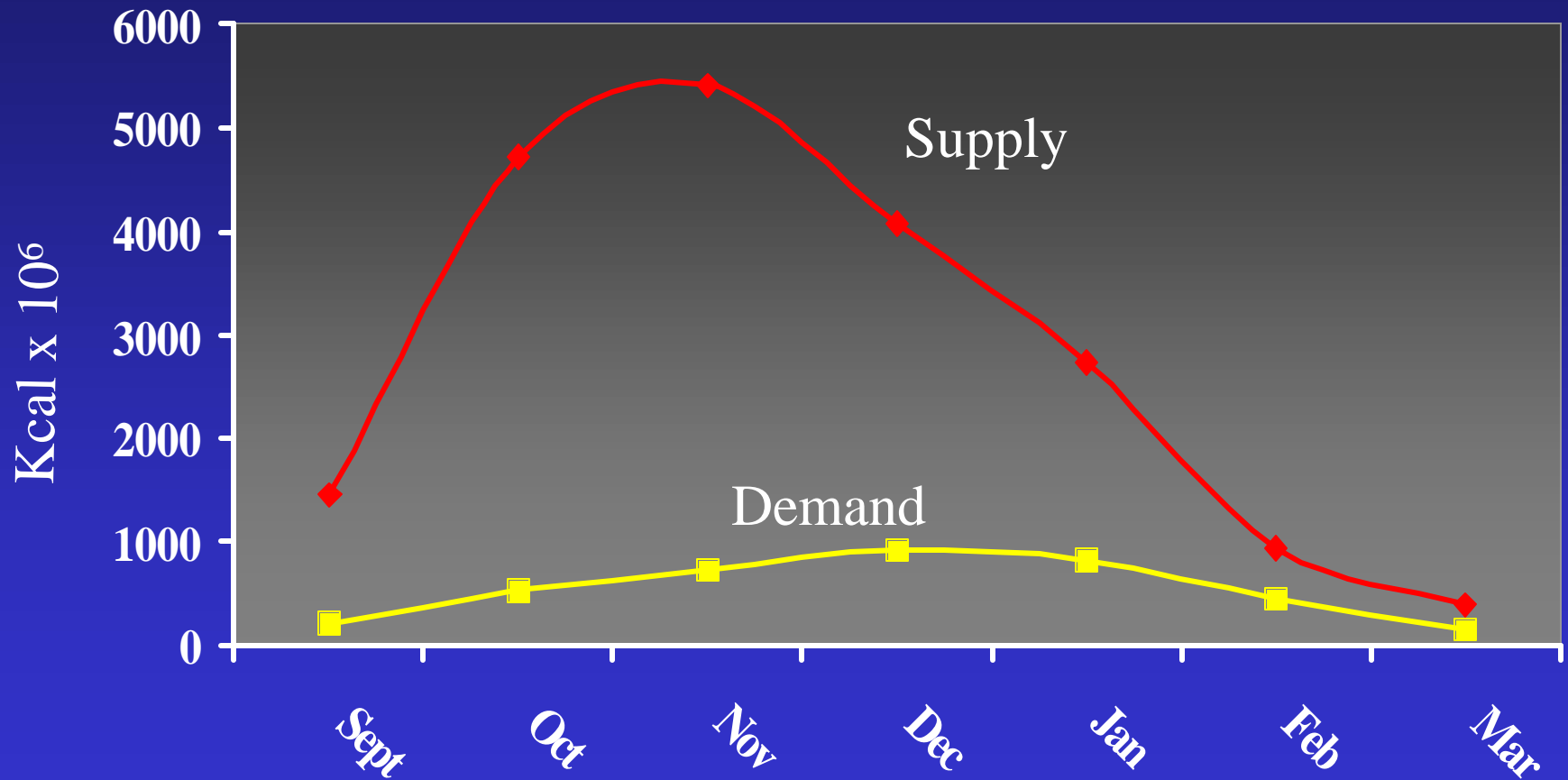
# Energy Demand Vs. Energy Supply



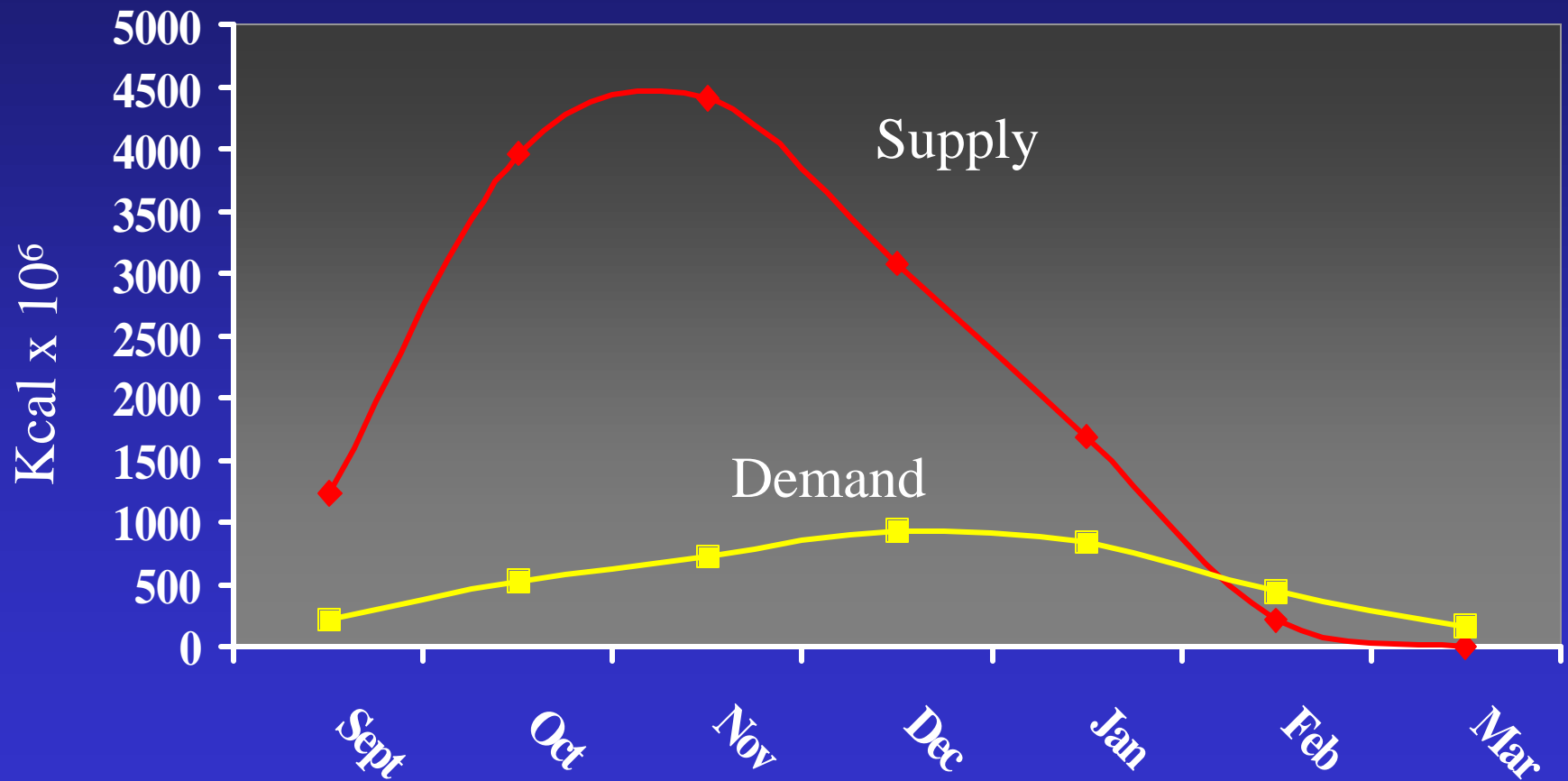
# Energy Demand Vs. Energy Supply



# Energy Demand Vs. Energy Supply



# Energy Demand Vs. Energy Supply





# Conclusions

- ❑ We have a tool to estimate habitat needs of waterfowl using Suisun Marsh and to predict changes in carrying capacity, if any, of tidal restoration
- ❑ Lack information on food densities in Suisun habitats (Tidal and Non-Tidal).